Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

KIRKPATRICK, M. G. *The Rural School from Within.* Philadelphia: J. B. Lippincott Co., 1917.

This adds another to the rapidly growing list of books that deal with the rural school from one angle or another. Its title is unique and suggestive, and its chapter headings include "Living up to Reputation," "Onward Christian Soldiers," "In Loco Parentis," "Bossing One's Employer," "Managing Girls," etc.

There is nothing vitally new in the book except the style of presentation, which is autobiographical. The fundamental propositions which it presents are thus embodied in a form that should secure an audience from young people who are preparing for teaching, particularly in rural schools. It recounts incidents and describes customs and practices formerly common in rural communities. It makes these the medium through which to present modes of treatment of boys and girls of school age. To the young rural teacher it suggests ways of getting a better rural community interest. The "suggested improvements" include nothing new, but serve to impress these things on the beginning teacher.

On the whole the spirit and tone of the book is sane and helpful and will help to inspire those who sincerely desire to render service to country people.

GEORGE L. ROBERTS

PURDUE UNIVERSITY

RICHARDSON, ROBERT P., AND LANDIS, EDWARD H. *Fundamental Conceptions of Modern Mathematics. Variables and Quantities with a Discussion of the General Functional Relation.* Chicago and London: Open Court Publishing Co., 1916. Pp. xxi+216.

The book before us is one of a projected series of thirteen upon the general subject of fundamental conceptions of mathematics and bears the subtitle *Variables and Quantities.* It consists of a preface in which the authors express both their contempt and their pity for the weaknesses of mathematics and for certain schools of philosophers; one chapter of 169 pages on "Variables and Quantities"; and one chapter of 29 pages on "The General Conception of the Functional Relation."

To the mathematician seeking a constructive criticism of his own science from the standpoint of philosophy, and to the philosopher seeking a rational account of the "science of self-evident things" in terms of the broader concepts of philosophy, the book will prove a disappointment. The authors profess to find the keynote of their work in "the distinction we find it necessary to make between quantities, values, and variables on the one hand, and between symbols and the quantities they represent on the other." They especially deplore the confusion they seem to find between symbols and the quantities they represent and the alleged tendency on the part of certain mathematicians to make mathematics entirely a matter of symbolism.

Apparently the authors would make vectors and relations the entities which lie behind the algebraic symbols, though this is by no means clear. From the standpoint of the mathematician such a view is wholly untenable. They speak, for example, of the *geometric* representation of an ordinary complex number. It is wholly immaterial whether this representation consists of a broken line drawn from the "origin," to a point, or of a directed straight line drawn from the origin to the same point, or of the point itself. It is the pair of numbers which enables him to locate the point that interests him. For many purposes it is better to represent complex numbers upon the surface of a sphere rather than upon the so-called Argand plane, or upon a "Riemann surface" which has no particular shape and may be deformed at will, subject to certain definite restrictions. The ordinary Argand representation of complex numbers rests essentially upon a co-ordinate system. Co-ordinate systems, important as they are, are mere scaffolds by means of which the building itself is to be erected. It is not the relation of a curve to a particular co-ordinate system that interests us most, but the properties of the curve that are independent of all co-ordinate systems. Euler and Demoivre gave us an almost complete theory of ordinary complex numbers nearly a hundred years before the geometric representation was discovered by Argand and Gauss. Moreover, geometric representation is impossible for complex numbers with more than three independent units.

In various places (pp. 31, 40, 41) they speak of quaternions as "applicate" or denominate quantities; but on p. 46 they say: "It is by no means superfluous for us to insist that a quarternion is nothing more or less than an abstract quantity." They take issue with Hamilton and Cayley in their assertions that i, j, and k of Hamilton's quaternion theory are wholly distinct from the i or ordinary complex numbers, but on p. 135 they give explicit formulas showing that the "old and ordinary imaginary symbol of common algebra," as Hamilton termed it, satisfies the commutative law for multiplication when combined with the i, j, and k, which is not true of these numbers themselves.

Rejecting Hamilton's definition of a quaternion as the quotient of two vectors, the authors define it as a "relation," saying that they do not "regard a ratio or a quotient as a relation." "Though it is true that each relational quantity may on occasion be a ratio or a quotient, it need not necessarily be so; a relational quantity may exist for millions and millions of years and never be chosen for such a rôle."

In a book which has for its avowed purpose the criticism of current definitions relating to variables and functions, the reader has a reasonable right to expect that some attempt at a constructive definition of a variable shall be made. Instead, we read on p. 155: "Any attempt to give a precise definition of the term variable would require a somewhat lengthy consideration of the philosophical theory of categories, which cannot be given in this place." Following this declaration is a brief statement of the relation existing between the various schools of philosophy, in the course of which we are told that the authors uphold the more extreme form of expiricism, which they denote "provisionally" by the title nominalism. For the mathematician who believes that any attempt to interpret mathematics in the light of a particular philosophical doctrine is probably foredoomed to failure, this fact might easily be made to account for some, though by no means all, of the vagaries of the book.

Both from the standpoint of mathematics and of philosophy the publication of such a book is distinctly unfortunate, and it is sincerely to be hoped that the publishers may take the necessary steps adequately to inform themselves concerning the character of any future volumes of the projected series that may be offered before giving them to the public.

KOOS, L. V. *The Administration of Secondary-School Units.* Chicago: The University of Chicago Press, 1917. Pp. 294. $1.00.

In this monograph of 194 pages Dr. Koos "presents, largely from the view of the Educational Administration, the results of an investigation into the status of the teaching of almost all subjects appearing in the secondary-school program of study." The data for the study were collected for the use of the Committee on Reorganization of the Secondary School and the Definition of the Unit of the North Central Association of Colleges and Secondary Schools.

The subjects included in the report are Latin; Greek; German; French; Spanish; algebra; geometry; trigonometry; general science; physiography; botany; zoölogy; biology; chemistry; physics; agriculture; ancient, mediaeval and modern, English, and American history; civics; economics; manual training; home economics and household art; commercial subjects; art; music; and public speaking. These subjects are grouped and discussed under the following heads: "Foreign Languages," "Mathematics," "Science," "History and Other Social Studies," "The Vocational Subjects," "The Fine Arts," and "Public Speaking." Such topics as extent of the offering, methods, aims, and organization are discussed in their application to each of the foregoing subjects.

The questionnaire method was used in collecting the data for the study. It should be said, however, that Dr. Koos's precautions relative to the selection of individuals to make reports and the formulation of the questions saved the study from the usual pitfalls of a report of this type. It is not too much to say of the monograph that it is a model study based on material collected by the questionnaire method. It will certainly prove of great practical value to high-school teachers and administrators and to persons anticipating a similar study by the same method.